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**(54) PRINTED MATTER AND PRINTING METHOD**

DRUCKSACHE UND DRUCKVERFAHREN

MATIERE IMPRIMEE ET PROCEDE D'IMPRESSION

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(56) References cited:  
**EP-A- 0 194 042 CA-A- 1 019 012  
JP-A-55 117 689 JP-B- 3 067 878  
US-A- 4 033 059 US-A- 4 715 623  
US-A- 4 796 921**

• **PATENT ABSTRACTS OF JAPAN vol. 14 no. 357  
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**EP 0 642 933 B1**

## Description

### [Field of the Invention]

This invention relates to a printed matter which is required to have some protection so as not to be counterfeited or falsified, such as bill (paper money), bank note, security paper, passport, credit card, or other valuable printed matter. The invention also relates to a method for printing the above printed matter.

### [Background of the invention]

Bill (paper money), bank note, security paper, passport, credit card, and other valuable printed matter are required, as their nature, to be designed such that they are not easily counterfeited or falsified. As measures for preventing the counterfeit of such printed matters, there are known three types; the first one has a plurality of small and large half tone dots applied thereto at the printing time, the second one has a moire pattern, and the third one is provided with a latent image (hidden letters and figures) applied thereto by properly determining the drawing direction of image lines and the quantity of ink to be applied. However, since the printed matters provided with the above counter-measures against counterfeit can be counterfeited by an ordinary photometrical process, they are not very effective for preventing the counterfeit. In addition, recently, it became possible to make photocopies of the bills, the bank notes, the security papers, etc. in such a manner as to resemble to the real ones at a look by a black and white copying machine or a colour copying machine.

It is an object of the present invention to provide an anti-counterfeit printed matter, which is difficult to be counterfeited and falsified by a colour copying machine or a photomechanical process. Any attempt for copying the printed matter of the present invention using the colour copying machine or the photomechanical process will be failed, which makes it possible for anybody to easily distinguish between the false from the truth. The present invention is to provide a method for printing such products and valuable printed matters which are required to have means for preventing counterfeit and falsification.

Japanese abstract JP-A-0212708 discloses a method for producing a latent image pattern which uses offset printing and intaglio printing. The pattern is produced using offset ink and intaglio ink which are mutually repellent. As a consequence intaglio ink and offset ink cannot be printed on top of each other. The intaglio ink is printed in all the positions where there is no offset ink but only in these positions. It is stated in JP-A-0212708 that a latent image appears or disappears when the angle of view is changed.

US Patent US-4,033,059 discloses the formation of latent images using only intaglio printing. Intaglio ink of a different colour from that of the substrate on which it is

printed is used. Patterns are formed by providing intaglio ink to different depths or in different orientations in different regions. It is stated in US 4,033,059 that a latent image appears or disappears when the angle of view is changed.

### (Disclosure of the invention)

According to one aspect of the present invention, there is provided a latent image printed matter comprising a substrate wherein:

one of various kinds of patterns including a pattern, a relief pattern or a combination thereof, each formed by straight and/or wavy raised image printed lines are printed, in raised condition, on said substrate, said raised image printed lines being printed in coloured ink of a same or similar colour to that of the substrate;

a plurality of straight and/or wavy printed lines are provided on the surface of said substrate provided with said raised image printed lines, at predetermined spaces in a parallel relation or in a slant relation to said raised image printed lines; said straight and/or wavy printed lines being printed in a colour other than a colourless transparent colour and other than the colour of the raised image printed lines;

said raised image printed lines within defined portions being, at least in part, provided substantially at an angle with respect to said raised image printed lines outside said defined portions; and an angular relationship between said raised image printed lines and said straight and/or wavy printed lines within said defined portions being, at least in part, substantially different from a corresponding angular relationship outside said defined portions.

According to another aspect of the present invention there is provided a method for making a latent image printed matter comprising the steps of:

printing, in a raised condition, raised image printed lines on a substrate in such a manner as to exhibit one of various kinds of patterns including a pattern, a relief pattern or a combination thereof;

said various kinds of patterns comprising said raised image printed lines which are straight and/or wavy and are printed in coloured ink of a same or similar colour to that of the substrate;

printing on the surface of said substrate on which said raised image printed lines are printed, a plurality of straight and/or wavy printed lines at predetermined spaces, in a parallel relation or in a slant relation to said raised image printed lines; said straight and/or wavy printed lines being printed in a colour other than a colourless transparent colour and other than the colour of the raised image

printed lines;

said raised image printed lines within defined portions being, at least in part, provided substantially at an angle with respect to said raised image printed lines outside said defined portions; and an angular relationship between said raised image printed lines and said straight and/or wavy printed lines within said defined portions being, at least in part, substantially different from a corresponding angular relationship outside said defined portions.

The printed matter in which a latent image such as letters, figures, etc can be visually recognised only when viewed in an adequate direction. It is difficult to be counterfeited and falsified by a colour copying machine or photomechanical process. Any attempt for copying the printed matter of the present invention using the colour copying machine or the photomechanical process will be failed which makes it possible for anybody to easily distinguish between the false from the truth. The present invention is to provide such products which are required to have means for preventing counterfeit and falsification.

(Brief description of the drawings)

Fig. 1(a) is a view showing straight image lines forming a straight line pattern by drawing the straight image lines partly at different angles;  
 Fig. 1(b) is a view showing straight lines;  
 Fig. 1(c) is a view showing a relief pattern;  
 Fig. 1(d) is a view showing background pattern;  
 Fig. 2 is a view of a printed matter according to a first embodiment of the present invention, when viewed in a direction perpendicular to a paper surface;  
 Fig. 3(a) is a schematic view of the printed matter of Fig. 2, when viewed in a direction right angle to the straight lines and slant to the paper surface;  
 Fig. 3(b) is a partly enlarged view of a part  $\alpha$  of Fig. 3(a);  
 Fig. 4 is an explanatory view of an enlarged cross-section taken on lines x-x' of Fig. 3(a);  
 Fig. 5(a) is a schematic view of a printed matter according to a second embodiment of the present invention, when viewed in a direction right angle to the straight lines and slant to the paper surface;  
 Fig. 5(b) is a partly enlarged view of Fig. 5(a);  
 Fig. 6 is an explanatory view showing an enlarged cross-section taken on line y-y' of Fig. 5(a);  
 Fig. 7 is a view of a printed matter according to a third embodiment of the present invention, when viewed in a direction perpendicular to the paper surface;  
 Fig. 8 is a partly enlarged view of the printed matter of Fig. 7, when viewed in a direction right angle to the straight lines and slant to the paper surface;  
 Fig. 9 is an explanatory view showing a partly

enlarged cross-section of Fig. 7; and

Fig. 10 is an explanatory view showing a partly enlarged cross-section of a printed matter according to a fourth embodiment of the present invention.

(Detailed description of the embodiments)

The present invention of a first embodiment will now be described in detail with reference to the accompanying drawings. Fig. 1(a) is a straight image lines (1'), in which a straight line pattern (1) (approximately 39 straight lines per cm (100 straight lines per inch), and the line area is 50%) expressing, as one of patterns, a figure (f) (T-shaped figure in the example of Fig. 1(a)) formed at a central portion by partly drawing straight image lines (1') at different angles. This straight lines pattern (1) is printed on a white paper (5) (see Fig. 4) in opaque white intaglio ink using an intaglio plate made from film expressing the straight lines pattern (1) by etching or the like. The straight image lines (1') of the straight pattern is printed to form a straight image printed lines (1"). Straight lines (2) (in Fig. 1(b), approximately 39 straight lines per cm (100 straight lines per inch), and the line area is 10 to 80%) arranged at predetermined spaces are offset-printed on the straight image printed lines (1") in parallel relation (or in slant relation) to the straight image printed lines (1") in coloured ink excluding opaque white ink or colorless transparent ink to obtain a latent image printed matter (A) having a latent image. In Fig. 4, reference numeral (2') denotes straight printed lines obtained by printing the straight lines (2).

Fig. 2 shows a view of this latent image printed matter (A) when viewed in a direction perpendicular to the paper surface. Fig. 3(a) is a view of the latent image printed matter (A) when viewed in a direction right angle to the straight printed lines (2') and slant to the paper surface. Fig. 3(b) is an enlarged view of a portion  $\alpha$  of Fig. 3(a). When the latent image printed matter (A) is viewed in a perpendicular direction to the paper surface (X-direction of Fig. 4) as in Fig. 2, it is only the colored straight printed lines (2') that can be visually recognized and the figure (f) cannot be visually recognized because the color of the straight image printed lines (1") is same to that of the white paper (5). When the latent image printed matter (A) is viewed in a direction right angle to the paper surface (Y-direction of Fig. 4) as in Fig. 3(a), the figure (f) can be very easily visually recognized because the colored straight printed lines (2') are partly hidden by the straight image printed lines (1"). When the latent image printed matter (A) is viewed in a direction right angle to the straight printed lines (2') and reversely slant to the paper surface of Fig. 3(a), the figure (f) can be likewise visually recognized but the light and shade are reversed.

Fig. 4 is an enlarged sectional view of the latent image printed matter (A) taken on line x-x' of Fig. 3(a), in which there are straight image printed lines (1")

[intaglio printed lines in Fig. 4] raised on the white paper (5), and the straight printed lines (2') printed, at predetermined spaces, on the straight image printed lines (1'') expressing this figure (f).

Although the straight printed lines (2') are printed at regular spaces here, the straight image printed lines (1'') are changed in position relative to the straight printed lines (2') because the angle is changed at the figure (f) portion as shown in Fig. 1(a). For this reason, the straight printed lines (2') are partly printed on the straight image printed lines (1'') and partly on other area. When this latent image printed matter (A) is viewed at a X-direction, the straight printed lines (2') are seen as having an equal width. However, when the latent image printed matter (A) is viewed in a Y-direction, the straight image printed lines (1'') are seen as being raised and the straight printed lines (2') are partly hidden by the raised straight image printed lines (1''). Since density of different colors is visually recognized depending on position, the figure (f) of the latent image appears. Even if an intaglio ink having a slightly transparent property is used for drawing the straight image printed lines (1'') here, the figure (f) can be easily visually recognized. Even if the line number and line area of the straight printed lines (2') are made fine or rough, and even if the straight printed lines (2') are changed to half-tone dots, there can be obtained the latent image printed matter (A) in which the figure (f) can be easily visually recognized.

Instead of the intaglio printing, ink may be printed in raised condition by a screen printing with the same functions and effects. The substrate to be printed is not only limited to the afore-mentioned paper but it may be a metal material or a synthetic resin material. Even if the printing is made on the metal material or the synthetic resin material, there can be obtained a printed matter having the same functions and effects as in the paper.

Instead of the straight image lines (1'), the above figure (f) may be expressed by wavy image lines, or by combination of the straight and wavy image lines. In the case where the wavy image lines are used, the wavy lines are printed on the wavy image lines.

As a second embodiment of the present invention, relief pattern printed lines (3'') are printed on the white paper (5) in intaglio ink of an opaque white color using an intaglio plate made, by etching, from a film expressing the relief pattern (3) (three-dimensional pattern obtained by partly changing a space between adjacent parallel relief image lines (3') (approximately 39 lines per cm (100 lines per inch), and the line area is 50%) representing a cherry blossom-like figure (f') of Fig. 1(c). The straight printed lines (2') are offset-printed, at predetermined spaces, on the relief pattern printed lines (3'') in colored ink other than the above-mentioned white and colorless transparent colors in parallel relation (or in slant relation) to the relief pattern printed lines (3''). In this way, a latent image printed matter (B) of Fig. 5(a) is made.

When this latent image printed matter (B) is viewed in a perpendicular direction to the paper surface, it is only the colored straight printed lines (2') that can be visually recognized and the cherry blossom-like figure (f') cannot be visually recognized because the color of the relief pattern printed lines (3'') is same to that of the white paper (5). Fig. 5(a) is a view showing the latent image printed matter (B) when viewed in a direction right angle to the straight printed lines (2') and slant to the paper surface. Fig. 5(b) is an enlarged view of a portion  $\beta$  of Fig. 5(a). When the latent image printed matter (B) is viewed in a perpendicular direction to the paper surface, it is only the colored straight printed lines (2') that can be visually recognized and the relief pattern (3) cannot be visually recognized. When the latent image printed matter (B) is viewed right angle to the straight printed lines (2') and slant to the paper surface as in Fig. 5(a), the cherry blossom-like figure (f') of the relief pattern (3) can be very easily visually recognized. When the latent image printed matter (B) is viewed in a perpendicular direction to the straight printed lines (2') and reversely slant to the paper surface of Fig. 5(a), the cherry blossom-like figure (f') can likewise be visually recognised but the light and shade of the relief pattern (3) are reversed.

Fig. 6 is an explanatory view of an enlarged section taken on line y-y' of the latent image printed matter (B) of Fig. 5(a). In Fig. 6, the relief pattern printed lines (3'') [intaglio printed lines in the illustrated example] are printed at irregular spaces on the white paper (5) in raised condition, and the straight printed lines (2') are printed at predetermined spaces on these relief pattern printed lines (3''). The principle why the cherry blossom-like figure (f') as the latent image appears here is the same to that of the first embodiment.

Even if an intaglio ink having a slightly transparent property is used for drawing the relief pattern printed lines (3''), the figure (f') can be easily visually recognized. Even if the straight printed lines (2') are changed to printed half-tone dots, there can be obtained the latent image printed matter in which the figure (f') can be easily visually recognized.

As a third embodiment of the present invention, a background pattern (4) [Fig. 1(d)] is printed on the white paper (5) in colored ink other than white and colorless transparent colors. The relief pattern printed lines (3'') are printed on the printed background pattern (4) in intaglio ink of an opaque white color using an intaglio plate made, by etching, from a film expressing the relief pattern (3). The straight printed lines (2') are offset-printed, at predetermined spaces, on the printed background pattern (4) and the relief pattern printed lines (3'') in colored ink other than those of the printed background pattern (4) and the relief pattern printed lines (3'') in parallel relation (or in slant relation) to the relief pattern printed lines (3''). In this way, a latent image printed matter (C) is made (see Fig. 9).

Fig. 7 is a view of the latent image printed matter

(C) when viewed in a perpendicular direction to the paper surface. Fig. 8 is a view of the latent image printed matter (C) when viewed in a direction right angle to the straight printed lines (2') and slant to the paper surface. When this latent image printed matter (C) is viewed in the perpendicular direction to the paper surface as shown in Fig. 7, it is only the colored straight printed lines (2') and printed background pattern (4') that can be visually recognized and the figure (f') cannot be visually recognized because the color of the relief pattern printed lines (3'') is same to that of the white paper (5). When the latent image printed matter (C) is viewed in a direction right angle to the straight printed lines (2') and slant to the paper surface, the cherry blossom-like figure (f') can be very easily visually recognized as shown in Fig. 8. When the latent image printed matter (C) is viewed in a direction right angle to the straight printed lines (2') and reversely slant to the paper surface of Fig. 8, the figure (f') can be likewise visually recognized but light and shade are reversed. Even if an intaglio ink having a slightly transparent property is used for drawing the relief pattern printed lines (3''), the figure (f') can be easily visually recognized. Even if the straight printed lines (2') are changed to printed half-tone dots, the figure (f') can be easily visually recognized. When the latent image printed matter (C) is viewed in the perpendicular direction to the paper surface as mentioned above, it is difficult to visually recognize the cherry blossom-like figure (f') of the latent image because of the provision of the printed background pattern (4'). The latent image printed matter (C) provided with such background printing as well as a latent image printed matters (D) and (D') as later described can be printed matters exhibiting sufficient effects in view of beauty. When the latent image printed matter (C) is viewed in a perpendicular direction to the paper surface, it is difficult to visually recognize the cherry blossom-like figure (f') of the latent image because of the provision of the background printing, and therefore, the latent image printed matter (C) can exhibit a sufficient effect also in view of beauty. Fig. 9 is an explanatory view of an enlarged section of the same portion as the second embodiment [portion taken on line y-y' of Fig. 5(a)] of the latent image printed matter (C). In Fig. 9, the printed background pattern (4') is drawn on the white paper (5), and the relief pattern printed lines (3'') [intaglio printed lines in the illustrated example] are printed at irregular spaces on the printed background pattern (4'), and the straight printed lines (2') are printed at predetermined spaces on the printed background pattern (4') and relief pattern printed lines (3''). The principle why the cherry blossom-like figure (f') as the latent image appears here is the same to that of the first embodiment.

Furthermore, as a fourth embodiment, the relief pattern (3) are printed on the white paper (5) in intaglio ink of a white color using an intaglio plate made, by etching, from a film expressing relief pattern (3) (see Fig. 10). The background pattern (4) is printed on the

relief pattern printed lines (3'') in colored ink other than white color. The straight printed lines (2') are offset-printed, at predetermined spaces, on the relief pattern printed lines (3'') and the printed background pattern (4') in colored ink other than those of the relief pattern printed lines (3'') and the printed background pattern (4') in parallel relation (or in slant relation) to the relief pattern printed lines (3''). In this way, a latent image printed matter (D) is made.

When the latent image printed matter (D) is viewed in a perpendicular direction to the paper surface, it is only the colored straight printed lines (2') and printed background pattern (4') that can be visually recognized and the figure (f') cannot be visually recognized because the color of the relief pattern printed lines (3'') is same to that of the white paper (5). When the latent image printed matter (D) is viewed in a direction right angle to the straight printed lines (2') and slant to the paper surface, the figure (f') can be very easily visually recognized. When the latent image printed matter (D) is viewed in a direction reversely slant to the paper surface, the figure (f') can be likewise visually recognized because light and shade are reversed. Even if an intaglio ink having a slightly transparent property is used for drawing the relief pattern printed lines (3''), the figure (f') can be easily visually recognized. Even if the straight printed lines (2') are changed to half-tone dots, the figure (f') can be easily visually recognized.

Furthermore, even if the printed background pattern (4') and the straight printed lines (2') are printed in a reverse order, there can be obtained a latent image printed matter (D') [not shown] which exhibits the same functions and effects.

Fig. 10 is an explanatory view of an enlarged section of the same portion as the second embodiment [portion taken on line y-y' of Fig. 5(a)] of the latent image printed matter (D). In Fig. 10, the raised relief pattern printed lines (3'') [intaglio printed lines in the illustrated example] are printed on the white paper (5), and the straight printed lines (2') are printed at predetermined spaces on the relief pattern printed lines (3'') and the printed background pattern (4').

The white paper (5) described in the respective embodiments may be, for example, a yellow paper. In that case, the ink used for the straight image printed lines (1'') and the relief pattern printed lines (3'') has the same yellow color as the paper.

When the present invention is applied to printing matters for which publicity and reliability are required, such as bills, bank notes, security papers, passports, credit cards and the like, it can be easily judged whether or not the bills, etc. are counterfeit notes because letters and figures can be very easily visually recognized only when they are observed in an adequate direction. Therefore, the bills, etc. incorporated with the present invention are very difficult to be counterfeited and/or falsified.

Any attempt for copying the printed matter of the

present invention using a color copying machine or a photomechanical process will be failed because it is practically impossible to extract the printed lines in their raised condition, and it is only the flat printed lines that can be reproduced. Since complicated moire pattern appears on the duplicated copy, the letters, figures, etc. cannot be visually recognized.

#### [Possibility of utilization for industry]

According to the present invention, there can be obtained a high quality latent image printed matter by printing the straight image printed lines, the wavy image printed lines, the relief image printed lines, the straight printed lines, the background image printed lines, etc. one upon another in raised condition by a printing machine. Such obtained printed matter includes a precise complicated latent image. It is the feature of the present invention that the printed matter of the present invention can be applied to an objective product having a comparatively small printing area. This means that the present invention is very effective when applied to bills, bank notes, security papers, passports, various kinds of credit cards, etc.

#### Claims

1. A latent image printed matter comprising a substrate (5) wherein:

one of various kinds of patterns including a pattern(1), a relief pattern(3) or a combination thereof, each formed by straight and/or wavy raised image printed lines(1", 3"), are printed, in raised condition, on said substrate(5), said raised image printed lines(1", 3") being printed in coloured ink of a same or similar colour to that of the substrate(5);

a plurality of straight and/or wavy printed lines(2') are provided on the surface of said substrate(5) provided with said raised image printed lines(1", 3"), at predetermined spaces in a parallel relation or in a slant relation to said raised image printed lines (1", 3"); said straight and/or wavy printed lines(2') being printed in a colour other than a colourless transparent colour and other than the colour of the raised image printed lines (1", 3");

said raised image printed lines(1", 3") within defined portions (f, f') being, at least in part, provided substantially at an angle with respect to said raised image printed lines (1", 3") outside said defined portions (f, f'); and an angular relationship between said raised image printed lines(1", 3") and said straight and/or wavy printed lines(2') within said defined portions (f, f') being, at least in part, substantially different from a corresponding angular

relationship outside said defined portions(f, f').

2. A method for making a latent image printed matter comprising the steps of:

printing, in a raised condition, raised image printed lines(1", 3") on a substrate(5) in such a manner as to exhibit one of various kinds of patterns including a pattern(1), a relief pattern(3) or a combination thereof;

said various kinds of patterns comprising said raised image printed lines(1", 3") which are straight and/or wavy and are printed in coloured ink of a same or similar colour to that of the substrate(5);

printing on the surface of said substrate(5) on which said raised image printed lines(1", 3") are printed, a plurality of straight and/or wavy printed lines(2') at predetermined spaces, in a parallel relation or in a slant relation to said raised image printed lines(1", 3"); said straight and/or wavy printed lines(2') being printed in a colour other than a colourless transparent colour and other than the colour of the raised image printed lines(1", 3");

said raised image printed lines(1", 3") within defined portions (f, f') being, at least in part, provided substantially at an angle with respect to said raised image printed lines(1", 3") outside said defined portions(f, f'); and

an angular relationship between said raised image printed lines(1", 3") and said straight and/or wavy printed lines(2') within said defined portions(f, f') being, at least in part, substantially different from a corresponding angular relationship outside said defined portions (f, f').

3. A latent image printed matter as claimed in Claim 1 characterised in that a printed background pattern(4') is printed underneath said raised image printed lines(1", 3") in an ink having a colour which contrasts with that of the substrate(5).
4. A latent image printed matter as claimed in Claim 1 characterised in that a printed background pattern(4') is printed over said raised image printed lines(1", 3") and underneath said straight and/or wavy printed lines (2' ) in an ink having a colour which contrasts with that of the substrate(5).
5. A latent image printed matter as claimed in Claim 1 characterised in that a printed background pattern(4') is printed over said straight and/or wavy printed lines(2') in an ink having a colour which contrasts with that of the substrate(5).
6. A latent image printed matter as claimed in Claim 1 characterised in that said substrate(5) is paper,

metal, or synthetic resin.

7. A latent image printed matter as claimed in Claim 1 characterised in that said straight and/or wavy printed lines(2') arranged at predetermined spaces comprise their halftone dots, or a combination of said straight and/or wavy lines and their halftone dots. 5
8. A method for making a latent image printed matter as claimed in Claim 2 characterised by the further step of printing a printed background pattern(4') on said substrate(5) before the step of printing said raised image printed lines(1", 3"); said printed background pattern(4') being printed in an ink having a colour which contrasts with that of the substrate(5). 10 15
9. A method for making a latent image printed matter as claimed in Claim 2 characterised by the further step of printing a printed background pattern(4') on said substrate(5) after the step of printing said raised image printed lines (1", 3") and before the step of printing said straight and/or wavy printed lines (2'); said printed background pattern(4') being printed in an ink having a colour which contrasts with that of the substrate(5). 20 25
10. A method for making a latent image printed matter as claimed in Claim 2 characterised by the further step of printing a printed background pattern (4') on said substrate(5) after the step of printing said straight and/or wavy printed lines(2'); said printed background pattern(4') being printed in an ink having a colour which contrasts with that of the substrate(5). 30 35
11. A method for making a latent image printed matter as claimed in Claim 2 wherein said substrate(5) is paper, metal, or synthetic resin. 40
12. A method for making a latent image printed matter as claimed in Claim 2 wherein said straight and/or wavy printed lines(2') arranged at predetermined spaces comprise their halftone dots, or a combination of said straight and/or wavy lines and their halftone dots. 45

#### Patentansprüche

1. Drucksache mit latentem Bild, die ein Substrat (5) aufweist, wobei:

eines von verschiedenen Arten von Mustern, die ein Muster (1), ein Reliefmuster (3) oder eine Kombination daraus umfassen, welche jeweils durch gerade und/oder wellig gedruckte Linien eines erhabenen Bildes (1", 3") gebildet

werden, in erhabenem Zustand auf das Substrat (5) gedruckt ist und die gedruckten Linien des erhabenen Bildes (1", 3") mit einer Farbtinte gedruckt sind, die die gleiche oder eine ähnliche Farbe wie die des Substrats (5) hat;

eine Vielzahl von gerade und/oder wellig gedruckten Linien (2') auf der Oberfläche des Substrats (5), das mit den gedruckten Linien des erhabenen Bildes (1", 3") versehen ist, in bestimmten Abständen parallel oder schräg zu den gedruckten Linien des erhabenen Bildes (1", 3") vorgesehen sind und die gerade und/oder wellig gedruckten Linien (2') in einer Farbe gedruckt sind, bei der es sich nicht um eine farblose, transparente Farbe und die Farbe der gedruckten Linien des erhabenen Bildes (1", 3") handelt;

die gedruckten Linien des erhabenen Bildes (1", 3") innerhalb definierter Bereiche (f, f') zumindest zum Teil im wesentlichen mit einem Winkel hinsichtlich der gedruckten Linien des erhabenen Bildes (1", 3") außerhalb der definierten Bereiche (f, f') vorgesehen sind, und

es eine Winkelbeziehung zwischen den gedruckten Linien des erhabenen Bildes (1", 3") und den gerade und/oder wellig gedruckten Linien (2') in den definierten Bereichen (f, f') gibt, die sich zumindest zum Teil wesentlich von einer entsprechenden Winkelbeziehung außerhalb der definierten Bereiche (f, f') unterscheidet.

2. Verfahren zur Herstellung einer Drucksache mit latentem Bild, bei dem:

in erhabener Form gedruckte Linien eines erhabenen Bildes (1", 3") so auf ein Substrat (5) gedruckt werden, daß sich eines von verschiedenen Arten von Mustern, die ein Muster (1), ein Reliefmuster (3) oder eine Kombination daraus umfassen, ergibt,

wobei die verschiedenen Arten von Mustern die gedruckten Linien des erhabenen Bildes (1", 3") aufweisen, die gerade und/oder wellig sind und in einer Farbtinte gedruckt sind, die die gleiche oder eine ähnliche Farbe hat wie die des Substrats (5),

auf die Oberfläche des Substrats (5), auf welche die gedruckten Linien des erhabenen Bildes (1", 3") gedruckt sind, eine Vielzahl von gerade und/oder wellig gedruckten Linien (2') in bestimmten Abständen parallel oder schräg zu den gedruckten Linien des erhabenen Bil-

des (1'', 3'') gedruckt werden und die gerade und/oder wellig gedruckten Linien (2') in einer Farbe gedruckt werden, bei der es sich nicht um eine farblose, transparente Farbe und die Farbe der gedruckten Linien des erhabenen Bildes (1'', 3'') handelt,

wobei die gedruckten Linien des erhabenen Bildes (1'', 3'') innerhalb definierter Bereiche (f, f') zumindest zum Teil im wesentlichen mit einem Winkel hinsichtlich der gedruckten Linien des erhabenen Bildes (1'', 3'') außerhalb der definierten Bereiche (f, f') vorgesehen sind, und

es eine Winkelbeziehung zwischen den gedruckten Linien des erhabenen Bildes (1'', 3'') und den gerade und/oder wellig gedruckten Linien (2') in den definierten Bereichen (f, f') gibt, die sich zumindest zum Teil wesentlich von einer entsprechenden Winkelbeziehung außerhalb der definierten Bereiche (f, f') unterscheidet.

3. Drucksache mit latenterm Bild nach Anspruch 1, dadurch gekennzeichnet, daß ein gedrucktes Hintergrundmuster (4') unter die gedruckten Linien des erhabenen Bildes (1'', 3'') in einer Tinte mit einer Farbe, die mit der des Substrats (5) kontrastiert, gedruckt ist.
4. Drucksache mit latenterm Bild nach Anspruch 1, dadurch gekennzeichnet, daß ein gedrucktes Hintergrundmuster (4') über die gedruckten Linien des erhabenen Bildes (1'', 3'') und unter die gerade und/oder wellig gedruckten Linien (2') in einer Tinte mit einer Farbe, die mit der des Substrats (5) kontrastiert, gedruckt ist.
5. Drucksache mit latenterm Bild nach Anspruch 1, dadurch gekennzeichnet, daß ein gedrucktes Hintergrundmuster (4') über die gerade und/oder wellig gedruckten Linien (2') in einer Tinte mit einer Farbe, die mit der des Substrats (5) kontrastiert, gedruckt ist.
6. Drucksache mit latenterm Bild nach Anspruch 1, dadurch gekennzeichnet, daß das Substrat (5) Papier, Metall oder synthetisches Harz ist.
7. Drucksache mit latenterm Bild nach Anspruch 1, dadurch gekennzeichnet, daß die in bestimmten Abständen angeordneten, gerade und/oder wellig gedruckten Linien (2') ihre Halbtonpunkte oder eine Kombination aus den geraden und/oder wellig gedruckten Linien (2') und ihren Halbtonpunkten umfassen.

8. Verfahren zur Herstellung einer Drucksache mit latenterm Bild nach Anspruch 2, dadurch gekennzeichnet, daß als weiterer Schritt vor dem Drucken der gedruckten Linien des erhabenen Bildes (1'', 3'') ein gedrucktes Hintergrundmuster (4') auf das Substrat (5) gedruckt wird, wobei das gedruckte Hintergrundmuster (4') mit einer Tinte mit einer Farbe, die mit der des Substrats (5) kontrastiert, gedruckt wird.

9. Verfahren zur Herstellung einer Drucksache mit latenterm Bild nach Anspruch 2, dadurch gekennzeichnet, daß als weiterer Schritt nach dem Drucken der gedruckten Linien des erhabenen Bildes (1'', 3'') und vor dem Drucken der gerade und/oder wellig gedruckten Linien (2') ein gedrucktes Hintergrundmuster (4') auf das Substrat (5) gedruckt wird, wobei das Hintergrundmuster (4') mit einer Tinte mit einer Farbe, die mit der des Substrats (5) kontrastiert, gedruckt wird.

10. Verfahren zur Herstellung einer Drucksache mit latenterm Bild nach Anspruch 2, dadurch gekennzeichnet, daß als weiterer Schritt nach dem Drucken der gerade und/oder wellig gedruckten Linien (2') ein gedrucktes Hintergrundmuster (4') auf das Substrat (5) gedruckt wird, wobei das gedruckte Hintergrundmuster (4') mit einer Tinte mit einer Farbe, die mit der des Substrats (5) kontrastiert, gedruckt wird.

11. Verfahren zur Herstellung einer Drucksache mit latenterm Bild nach Anspruch 2, wobei das Substrat (5) Papier, Metall oder synthetisches Harz ist.

12. Verfahren zur Herstellung einer Drucksache mit latenterm Bild nach Anspruch 2, wobei die in bestimmten Abständen angeordneten gerade und/oder wellig gedruckten Linien (2') ihre Halbtonpunkte oder eine Kombination aus den geraden und/oder welligen Linien und ihren Halbtonpunkten umfassen.

## Revendications

1. Matière imprimée à image latente comprenant un substrat (5) dans lequel :

l'un des différents types de dessins comprenant un dessin (1), un dessin en relief (3) ou une combinaison de ceux-ci, chacun formé par des lignes imprimées droites et/ou en relief sinueuses de l'image (1'', 3'') sont imprimés, en relief, sur le substrat (5), les lignes imprimées en relief de l'image (1'', 3'') étant imprimées dans une encre couleur d'une couleur identique ou similaire à celle du substrat (5);  
une pluralité de lignes (2') imprimées droites



et/ou sinueuses sont disposées à la surface du substrat (5) et comportent des lignes imprimées en relief de l'image (1", 3") à des espaces prédéterminés en relation parallèle ou en relation inclinée par rapport aux lignes imprimées en relief de l'image (1", 3") ; ces lignes imprimées droites et/ou sinueuses (2') étant imprimées en une couleur autre que la couleur transparente incolore et autre que la couleur des lignes imprimées en relief de l'image (1", 3") ;

ces lignes imprimées en relief de l'image (1", 3") à l'intérieur de portions définies (f, f') étant, au moins en partie, disposées sensiblement selon un angle par rapport aux lignes imprimées en relief de l'image (1", 3") à l'extérieur des portions imprimées (f, f') ; et une relation angulaire entre les lignes en relief de l'image (1", 3") et les lignes imprimées droites et/ou sinueuses (2') à l'intérieur des portions définies (f, f') étant au moins en partie sensiblement différente d'une relation angulaire correspondante à l'extérieur de ces portions définies (f, f').

## 2. Procédé pour réaliser une matière imprimée à image latente comprenant les étapes consistant à :

imprimer, en relief, des lignes imprimées en relief de l'image (1", 3") sur un substrat (5) de façon à présenter l'un des différents types de dessins y compris un dessin (1), un dessin en relief (3) ou leur combinaison ;

les différents types de dessins comprenant les lignes imprimées en relief de l'image (1", 3") qui sont droites et/ou sinueuses et sont imprimées en encre couleur, d'une couleur identique ou similaire à celle du substrat (5) ;

à imprimer à la surface du substrat (5) sur lequel sont imprimées les lignes imprimées en relief de l'image (1", 3") plusieurs lignes imprimées droites et/ou sinueuses (2') à des espacements prédéterminés, en relation parallèle ou en relation oblique par rapport aux lignes imprimées en relief de l'image (1", 3") ; les lignes imprimées droites et/ou sinueuses (2') étant imprimées en une couleur autre que la couleur transparente incolore et autre que la couleur des lignes imprimées en relief de l'image (1", 3") ;

les lignes imprimées en relief de l'image (1", 3") à l'intérieur de portions définies (f, f') étant, au moins en partie, disposées sensiblement selon un certain angle par rapport aux lignes imprimées en relief de l'image (1", 3") à l'extérieur des portions définies (f, f') ; et

une relation angulaire entre les lignes imprimées en relief de l'image (1", 3") et les lignes

imprimées droites et/ou sinueuses (2') à l'intérieur des portions définies (f, f') étant au moins en partie sensiblement différente d'une relation angulaire correspondante à l'extérieur des portions définies (f, f').

3. Matière imprimée à image latente selon la revendication 1, caractérisée en ce qu'un dessin de fond imprimé (4') est imprimé au dessous des lignes imprimées en relief de l'image (1", 3") dans une encre d'une couleur qui contraste avec celle du substrat (5).

4. Matière imprimée à image latente selon la revendication 1, caractérisée en ce qu'un dessin de fond imprimé (4') est imprimé par dessus les lignes imprimées en relief de l'image (1", 3") et au-dessous des lignes imprimées droites et/ou sinueuses (2') dans une encre d'une couleur qui contraste avec celle du substrat (5).

5. Matière imprimée à image latente selon la revendication 1, caractérisée en ce qu'un dessin de fond imprimé (4') est imprimé par dessus les lignes imprimées droites et/ou sinueuses (2') dans une encre d'une couleur qui contraste avec celle du substrat (5).

6. Matière imprimée à image latente selon la revendication 1, caractérisée en ce que le substrat (5) est du papier, du métal ou une résine synthétique.

7. Matière imprimée à image latente selon la revendication 1, caractérisée en ce que les lignes imprimées droites et/ou sinueuses (2') disposées selon des espaces prédéterminés sont constituées par leurs points de simili ou points de trame ou une combinaison de lignes droites et/ou sinueuses et leurs points de trame.

8. Procédé pour réaliser une matière imprimée à image latente selon la revendication 2, caractérisé par l'étape suivante d'impression d'un dessin de fond imprimé (4') sur le substrat (5) avant l'étape d'impression des lignes imprimées en relief de l'image (1", 3") ; le dessin de fond imprimé (4') étant imprimé dans une encre d'une couleur qui contraste avec celle du substrat (5).

9. Procédé pour réaliser une matière imprimée à image latente selon la revendication 2, caractérisé par l'étape supplémentaire consistant à imprimer un dessin de fond imprimé (4') sur le substrat (5) après l'étape d'impression des lignes imprimées en relief de l'image (1", 3") et avant l'étape d'impression des lignes imprimées droites et/ou sinueuses (2') ; le dessin de fond imprimé (4') étant imprimé dans une encre d'une couleur qui contraste avec

celle du substrat (5).

10. Procédé pour réaliser une matière imprimée à image latente selon la revendication 2, caractérisé par l'étape suivante consistant à imprimer un dessin de fond imprimé (4') sur le substrat (5) après l'étape d'impression des lignes imprimées droites et/ou sinueuses (2') ; le dessin de fond imprimé (4') étant imprimé dans une encre d'une couleur qui contraste avec celle du substrat (5).

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11. Procédé pour réaliser une matière imprimée à image latente selon la revendication 2, dans lequel le substrat (5) est du papier, du métal ou une résine synthétique.

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12. Procédé pour réaliser une matière imprimée à image latente selon la revendication 2, dans lequel les lignes imprimées droites et/ou sinueuses (2') disposées selon des espaces prédéterminés comprennent leurs points de trame ou une combinaison de lignes droites et/ou sinueuses et leurs points de trame.

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FIG. 1(a)

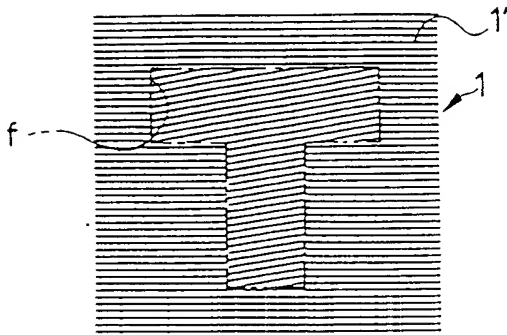


FIG. 1(b)

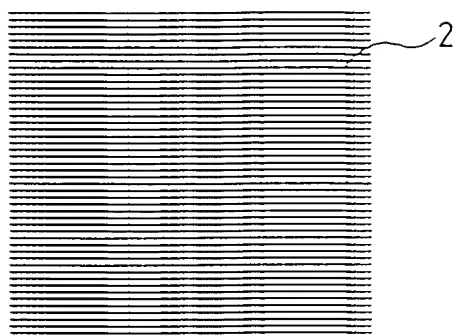


FIG. 1(c)

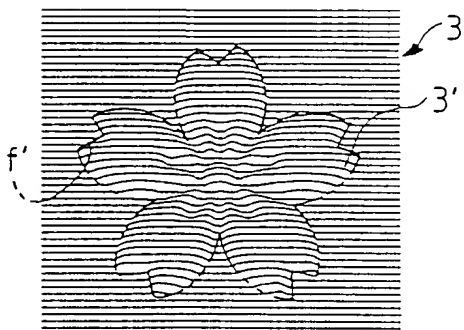


FIG. 1(d)

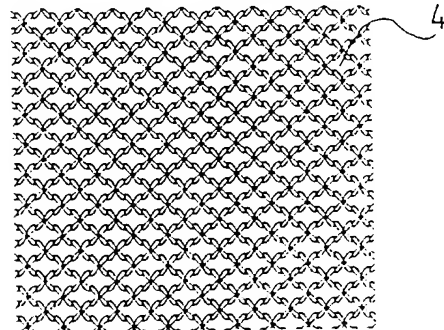


FIG. 2

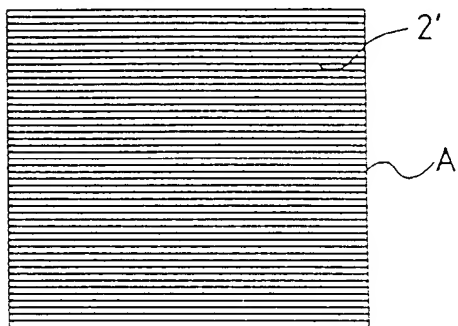


FIG. 3(a)

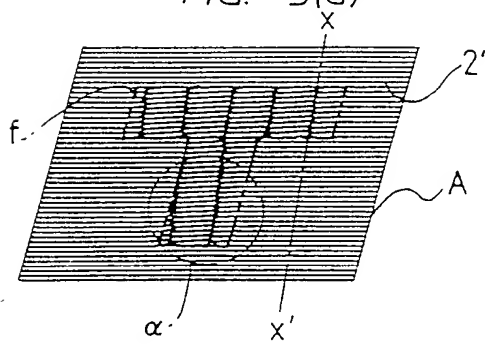
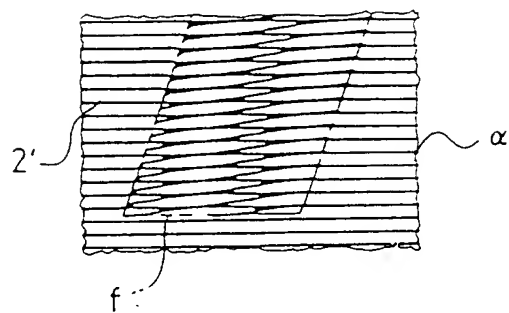


FIG. 3(b)



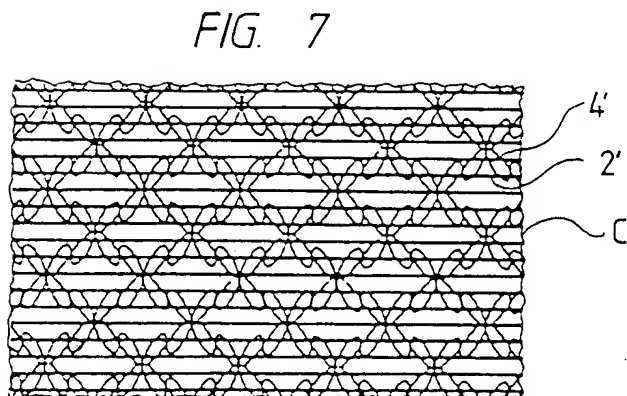
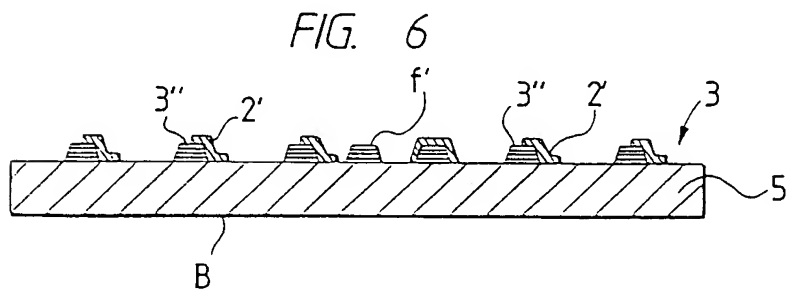
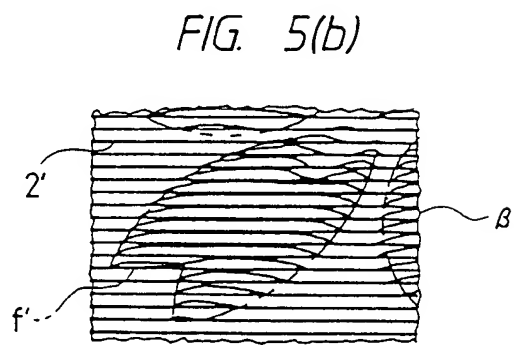
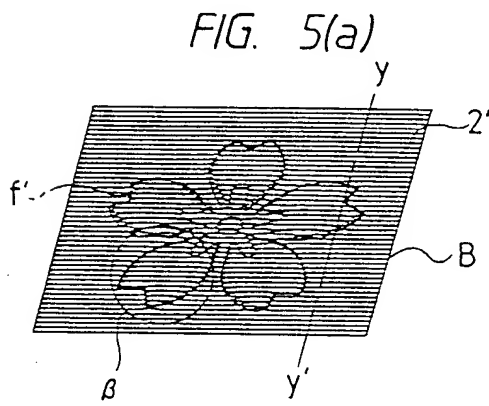
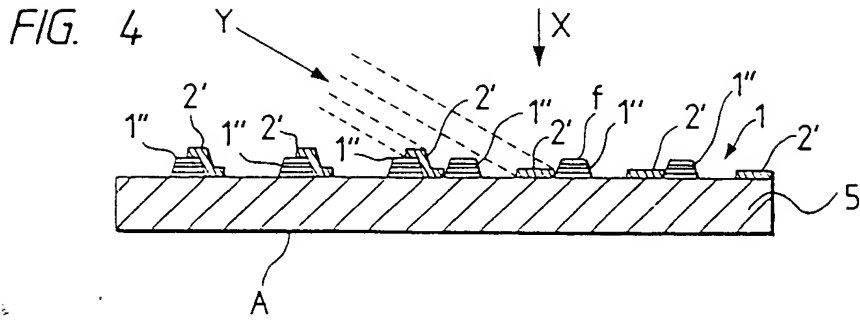


FIG. 8

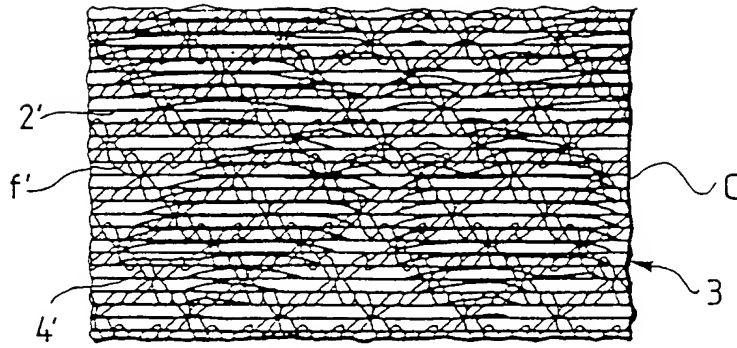


FIG. 9

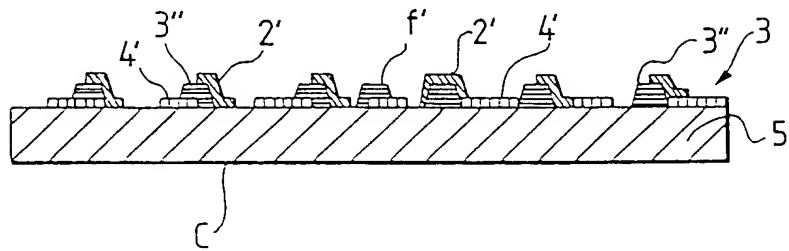


FIG. 10

